

**A SYSTEM AND METHOD FOR ELECTRONICALLY  
ESTIMATING TRAVEL COSTS**

CROSS-REFERENCE TO RELATED APPLICATION

This application claims priority of U.S. Provisional Patent Application No. 60/176,680 filed on January 18, 2000, the entire contents of which are hereby incorporated herein by reference.

BACKGROUND OF THE INVENTION

With the advancement of the Internet, electronic travel agencies for searching and booking airline tickets have become common. With more and more hotels and car rental agencies joining the ranks of e-commerce, a complete travel product package can be determined and booked without physically speaking to a travel agent. Presently, the booking of travel products over the Internet requires a user to input their exact requirements in terms of time and date of travel, destinations, types of hotels at which the user wishes to stay, etc. After the user inputs their exact requirements, the system searches through one or more databases and comes up with available products that satisfy the user's exact requirements and prices for the available products. Although the system may satisfy the needs of a customer based on the input requirements, this is not equivalent to customer interaction with a live travel agent.

Usually, when a customer interacts with a live travel agent, customer needs are determined through an interactive set of questions and answers, and some of the requirements are actually indeterminate and vague, subject to modification. For example, the customer may leave either on Friday or Saturday, but may have a preference for one of the two days. Depending on the price difference between the two days, the customer might choose one day over the other due to the price difference. A live travel agent is able to search and provide optimized travel packages in

1 a way that current Internet-based electronic travel agencies cannot.

5 There remains a need for an Internet-based electronic travel agency to provide a means of finding out prices of travel products similar to those requested by a customer, as well as the price variations of each, and to present various options to a customer for the customer to choose from.

#### 10 SUMMARY OF THE INVENTION

15 This invention, according to an embodiment, discloses a system and method by which a customer inputs desired travel product information. Once desired travel product information is received from a user the received information is used to search through a travel product database to determine the cost of the desired travel products. Once the cost of the desired travel products is obtained, the cost of each travel product is reported to the user. The user is also prompted to view alternative travel products. If a request to view alternative travel products is received, then a discount database is accessed in conjunction with travel products databases, and the initial user travel product request, to select alternative travel products. Alternative travel products are then selected and reported to the user.

25 In an embodiment, a user is prompted to select an airline departure date, a departure location, a destination location, and a seat class. The user is also prompted to enter a hotel location and a number of nights to reside at the hotel. Furthermore, a user is prompted to select a rental car location and a number of days a rental car will be rented. As an alternative to the user entering the number of nights to reside at the hotel and the number of days a rental car will be rented, the duration of time between the airplane departure date and the airplane return date may be used. Therefore, the number of days a rental car will be rented may be automatically changed when the

35

1 flight information is changed. As an alternative to the user  
entering the hotel location and the rental car location the  
airplane destination city may be used. Therefore, the hotel  
5 location and the rental car location may be automatically changed  
when the flight information is changed.

In another embodiment of the present invention, a user may  
select cruise travel products in conjunction with airplane, hotel  
and car rental travel products. A user is prompted to enter  
10 cruise product request information including a cruise departure  
date, a cruise departure location, a cruise destination location,  
a cruise return date, and a cruise passenger class.

In an embodiment, when displaying travel products, the  
system displays estimated prices for each travel product based  
upon availability of products from different product providers.  
15 The travel product display also has an estimated total price for  
all of the requested travel products.

In an embodiment, the user is prompted to request  
alternative travel product information. In response to a request  
for additional travel product information, a discount database  
is accessed to determine alternative travel products to offer the  
user. The alternative travel products are found by altering at  
20 least one of the departure flight city, the departure flight  
date, the destination city, the return flight date, the number  
of nights of hotel rental, the type of hotel rented, the number  
of days of car rental, and the type of car rented to conform to  
the requirements of at least one discount found in the discount  
database. In an alternative embodiment, alternative travel  
product information is automatically found and displayed for a  
30 user.

In an additional embodiment of the present invention, once  
a user has selected a set of travel products which meets their  
needs, the user is prompted to purchase the selected travel  
products. If the user elects to purchase the selected travel  
35 products, then the user is prompted to enter personal information

1 and payment information to initiate the purchase. Once the  
personal and payment information is obtained from a user, or from  
prior account information maintained for the user, the system  
5 contacts the travel product provider and reserves and purchases  
the selected travel products.

#### BRIEF DESCRIPTION OF THE DRAWINGS

10 These and other features and advantages of the present  
invention will be better understood by reference to the following  
detailed description when considered in conjunction with the  
accompanying drawings wherein:

15 FIG. 1 is a block diagram showing the relationship of parts  
of a system for estimating travel costs in accordance with one  
embodiment of the present invention;

FIG. 2 is a block diagram of a system for estimating travel  
costs in accordance with an embodiment of the present invention;

FIG. 3 shows the contents of a database of airline flight  
prices according to an embodiment of the present invention;

20 FIG. 4 shows the contents of a database of airline flight  
discount criteria and statistics according to an embodiment of  
the present invention;

FIG. 5 shows the contents of a database of hotel information  
and prices according to an embodiment of the present invention;

25 FIG. 6 shows a database of hotel discounts according to an  
embodiment of the present invention;

FIG. 7 shows a database of car rental prices and information  
according to an embodiment of the present invention;

30 FIG. 8 shows a database of car rental discount information  
according to an embodiment of the present invention;

FIG. 9 shows a user interface for user entered information  
according to an embodiment of the present invention; and

FIG. 10 shows the results presented to a user according to  
an embodiment of the present invention.

## 1 DETAILED DESCRIPTION OF THE INVENTION

5 An overview of an embodiment of the present invention is shown in FIG. 1. The system functions between a user device 220 and a server 222 communicating through the Internet 221. The server communicates a user interface 10 to the user device. The user device is coupled to a processor 12 within the server. The processor is in turn linked to an airline ticket statistical database 14, a hotel room statistical database 16, a car rental statistical database 18, and a discount database 19. Once travel product attributes are entered into the user interface 10 by a user, the user interface communicates with the processor 12. The processor retrieves relevant airline ticket price information and schedule information from the airline ticket statistical database 14. The processor 12 also obtains price and attribute information about hotel rooms from the hotel room statistical database 16. Furthermore, the processor receives car rental price and attribute information from the car rental statistical database 18. The processor then receives information from one or more discount databases to find alternative travel products.

20 FIG. 2 shows a block diagram of a typical Internet client/server environment used by the users and servers in one embodiment of the present invention. User devices 220a-220n used by the users are connected to the Internet 221 through communication links 233a-233n. Optionally, a local network 234 may serve as the connection between some of the user devices 220a-220n, such as the user device 220a and the Internet 221. Servers 222a-222m are also connected to the Internet 221 through respective communication links. Servers 222a-222m include information and databases accessible by the user devices 220a-220n. In one embodiment of the present invention, databases for storing travel product information reside on at least one of the servers 222a-222m and are accessible by users using one or more of the user devices 220a-220n to obtain travel product information.

1 In an alternative embodiment of the present invention, the  
travel product databases are stored on a Global Distribution  
System 240. Travel product information, including current travel  
5 prices and availability, is gathered from travel product  
providers and stored on the Global Distribution System 240. The  
Global Distribution System 240 is accessible by at least one of  
the servers 222a-222m through the Internet.

10 In yet another alternative embodiment, the travel product  
databases are stored on computers of the individual travel  
product providers. Each of the travel product databases stored  
on computers of the individual travel product providers contains  
travel product information, including current prices and  
15 availability. The databases stored on computers of the  
individual travel service providers are accessible by at least  
one of the servers 222a-222m through the Internet.

20 In one embodiment of the present invention, each of the user  
devices 220a-220n typically includes a central processing unit  
(CPU) 223 for processing and managing data; and a keyboard 224  
and a mouse 225 for inputting data. A main memory 227 such as  
a Random Access Memory (RAM), a video memory 228 for storing  
image data, and a mass storage device 231 such as a hard disk for  
25 storing data and programs are also included in a typical user  
device. Video data from the video memory 228 is displayed on a  
Display screen 230 by a display adapter 229 under the control of  
the CPU 223. A communication device 232, such as a modem,  
provides access to the Internet 221. Optionally, one or more of  
user devices 220a-220n may be connected to a local network 234.  
An Input/Output (I/O) device 226 reads data from various data  
30 sources and outputs data to various data destinations.

35 Servers (hosts) 222a-222m are also computers and typically  
have architecture similar to the architecture of user devices  
220a-220n. Generally, servers differ from the user devices in  
that servers can handle multiple telecommunications connections  
at one time. Usually, servers have more storage and memory

1 capabilities, and higher speed processors. Some server (host)  
systems may actually be several computers linked together, with  
each handling incoming web page requests. In one embodiment,  
5 each server 222a-222m has a storage medium 236a-236m, such as a  
hard disk, a CD drive, or a DVD for loading computer software.

When software such as the software responsible for executing  
the processes in FIGs. 1 and 3 to 10 is loaded on the server  
222a, an off-the-shelf web management software or load balancing  
10 software may distribute the different modules of the software to  
different servers 222a-222m. A server may utilize an operating  
system such as DOS, Microsoft Windows, or Linux. The server may  
use off the shelf, or open source software to generate and serve  
web pages. In an embodiment, the server uses Apache server  
15 software to generate and serve web pages. The page generating  
software generates web pages that have, for example, hypertext  
markup language (HTML) and Javascript components. Additionally,  
the server may be protected from unauthorized access by the use  
of a firewall, such as one produced by Checkpoint.

20 Therefore, in one embodiment, the computer program  
responsible for executing the present invention resides on one  
or more servers. Databases to carry out the processes of FIGs.  
1 and 3 to 10 may be created, maintained and edited in many  
different types of database software including Access, FoxPro,  
25 and Oracle. In one embodiment of the present invention the  
database software is made by Oracle.

An exemplary web site location 235 is shown on server 222a  
in FIG. 2. The web site 235 is the user interface for accessing  
the database described below. The web site 235 has a unique  
30 address that is used by the users to access server 222a (in this  
example) and the web site location on the server 222a. The  
computer software for executing the processes of the present  
invention may also reside on the web site 235.

FIG. 3 shows a representative portion of the airline ticket  
35 statistical database 14. As shown in FIG. 3, an airline

1 statistical database, according to an embodiment of the  
invention, contains several different fields. Those fields  
include the departure location 20, the arrival location 22, the  
5 minimum price 24, the maximum price 26, and the seat class of the  
entry 28.

10 Additionally, the airline ticket statistical database may  
contain fields for specific dates and days. In an embodiment,  
the minimum and maximum prices reflect a range that has been  
obtained by viewing the different prices offered by each airline  
travel provider, for a particular departure location, arrival  
location and seat class for a specific day and time period. In  
an additional embodiment, the airline ticket statistical database  
may contain information about the meals, movies, and consumer  
15 ratings for each flight, which may be communicated to a user, to  
help them select a flight.

20 In yet another additional embodiment, the processor accesses  
the databases of each airline travel provider at the time the  
user enters their request for travel products. The processor  
searches the databases of the airline travel providers using any  
relevant information provided by the user, such as the date of  
departure, city of departure, destination city, and return date.  
The processor then computes a range of prices from a minimum  
price to a maximum price, based on the prices found for flights  
that satisfy the user's travel product request. Searching travel  
25 product provider databases at the time of the user's travel  
product request, based on the parameters of the user's request,  
may be done for additional travel products, such as those  
discussed below.

30 FIG. 4 shows a representative database for airline ticket  
discount information. As shown in FIG. 4, the representative  
database may contain a field with the discount description 30,  
a field for the minimum percentage price discount for a given  
discount description 32, and a maximum percent discount for a  
35 given discount description 34. Representative discounts may



1 include a discount for round-trip tickets that have a weekend  
night in between, because the hotels may compensate the airlines  
for encouraging their passengers to spend a weekend night at the  
5 hotel.

Representative discounts may also include, for example,  
advanced ordering tickets, such as those ordered 21 days in  
advance, or 7 days in advance. Furthermore, discounts may be  
given for ordering non-refundable tickets. The percentage of  
10 savings varies depending on the type of discount. The discounts  
for more than one discount acquiring behavior may in some  
instances be combined for greater savings. In an additional  
embodiment of the present invention, after the user enters  
requested flight information, various airline companies are  
15 contacted to determine whether one or more airline companies are  
offering special discounts that are applicable to the requested  
flight. Discounts often range between airlines in terms of a  
discount percentage value of the normal flight price. The range  
is reflected in the minimum and maximum discount percentage rate  
20 for each type of discount.

In an alternative embodiment, the processor selects flight  
travel products by searching through the global distribution  
server, and possibly through travel product databases stored by  
individual travel product suppliers, to find alternative flight  
travel products. In an embodiment, the processor alters the  
25 desired flight travel product characteristics and searches based  
on the new characteristics. Alternatively, the processor  
searches the travel product databases for flight travel products  
having characteristics within a predetermined variation from the  
requested flight travel products. Preferably, the global  
30 distribution server and the individual travel product provider  
databases contain information regarding the discounts that each  
flight travel product is taking advantage of. Thus, the  
processor can determine the applicable discounts and communicate  
35 them to a user.

1           FIG. 5 shows an exemplary database of hotel information.  
The hotel information kept may include the city in which the  
hotel is located 40, and the ranking of the hotel in terms of the  
number of stars that it has received in guide books 42.  
5 Additional information about hotels may include the number of  
beds in the hotel room 44. As part of the hotel room  
information, the minimum price 46 for hotel rooms of hotels of  
a specified number of stars with a specified number of beds in  
a specified city. The database also contains a maximum price for  
10 a hotel of a given number of stars containing a specified number  
of beds in a specific city 48. In an embodiment of the present  
invention, the minimum and maximum prices are obtained by  
analyzing several different hotels with the specified number of  
stars and beds. In an additional embodiment, the hotel  
15 information database may contain additional information, such as  
whether the rooms in the hotel have cable television and whether  
the hotel has air conditioning which may be communicated to a  
user to help them choose a hotel.

20           Additionally, the hotel information database may contain  
fields for specific dates and days. In an embodiment, the  
minimum and maximum prices reflect a range that has been obtained  
by viewing the different prices for particular hotel rooms in a  
city for various day and time periods to determine fluctuations  
25 in price.

FIG. 6 shows a database with discount information for hotel  
rooms. A hotel room discount database according to an embodiment  
of the present invention may include a discount description field  
50, the minimum percentage discount that a particular discount  
will afford 52, and the maximum percentage discount that a given  
30 discount description will afford. For example, if a hotel room  
is rented for one week, often a weekly rate discount applies.  
Additionally, hotels often provide discounts for convention  
patrons, and for travel club members. The rate discounts often  
35 range in terms of a discount percentage value of the normal hotel

1 room price from hotel to hotel. This is why there is a range of  
minimum to maximum discounts listed for each type of discount.  
In an additional embodiment of the present invention, after the  
5 user enters requested hotel information, or after necessary hotel  
information is gleaned from the flight destination and the time  
between the departure flight and the return flight, various hotel  
companies are contacted to determine whether one or more hotel  
companies are offering special discounts that are applicable to  
10 the requested hotel.

15 In an alternative embodiment, the processor selects hotel  
travel products by searching through the global distribution  
server, and possibly through travel product databases stored by  
individual travel product suppliers, to find alternative hotel  
travel products. In an embodiment, the processor alters the  
desired hotel travel product characteristics and searches based  
on the new characteristics. Alternatively, the processor  
searches the databases for hotel travel products having  
characteristics within a predetermined variation from the  
20 requested hotel travel products. Preferably, the global  
distribution server and the individual travel product provider  
databases contain information regarding the discounts that each  
hotel travel product is taking advantage of. Thus, the processor  
can determine the applicable discounts and communicate them to  
25 a user.

30 FIG. 7 shows a representative car rental statistic table.  
A car rental statistical table according to an embodiment of the  
present invention contains the city in which the car will be  
rented 60. The auto rental database also contains the type of  
car that is being rented, for example, full size, medium size,  
and compact size. The table also contains a minimum price for  
a given size car in a specified city 64, as well as a maximum  
price for a given size car in a specified city. For example, a  
full size car in the city of New York may cost between a minimum  
35 price of \$60 per day and a maximum price of \$70 per day.

1           Additionally, the car rental statistical database may  
contain fields for specific dates and days. In an embodiment,  
the minimum and maximum prices reflect a range that has been  
5           obtained by viewing the different prices for particular rental  
car types in a given city for different given day and time  
periods.

10           FIG. 8 shows an exemplary discount table for auto rentals.  
The discount table for auto rentals according to an embodiment  
of the present invention contains a description of the discount  
70. The table also contains fields for the minimum percent price  
discount for a given discount description and a maximum  
percentage price discount for a given discount description. For  
example, often auto rental companies provide discounts for those  
15           rental customers who rent a car for one week or more. Often the  
percentage of discount from the daily rate that is afforded to  
a customer who rents a rental car for more than one week varies  
by company from a minimum percentage discount to a maximum  
percentage discount. In an additional embodiment of the present  
20           invention, after the user enters requested car rental  
information, or after necessary car rental information is gleaned  
from the flight destination and the time between the departure  
flight and the return flight, various car rental companies are  
contacted to determine whether one or more car rental companies  
25           are offering special discounts that are applicable to the  
requested car rental.

30           In an alternative embodiment, the processor selects car  
rental travel products by searching through the global  
distribution server, and possibly through travel product  
databases stored by individual travel product suppliers, to find  
alternative car rental travel products. In an embodiment, the  
processor alters the desired car rental travel product  
characteristics and searches based on the new characteristics.  
Alternatively, the processor searches the databases for car  
35           rental travel products having characteristics within a

1 predetermined variation from the requested car rental travel  
products. Preferably, the global distribution server and the  
individual travel product provider databases contain information  
5 regarding the discounts that each car rental travel product is  
taking advantage of. Thus, the processor can determine the  
applicable discounts and communicate them to a user.

FIG. 9 shows a user interface that is presented to the user  
of the present system according to an embodiment of the present  
invention. As shown in FIG. 9, a user is prompted to enter a  
10 departure location for an airline flight 76, as well as the  
departure date 77. A user is also prompted to enter the arrival  
destination city for the airline flight 78, as well as the date  
that they wish to return to the departure city 79. Below the  
airline information, the user is prompted to enter hotel  
15 information.

A user may enter the hotel information by selecting a given  
star categorization of a hotel 80. As shown in FIG. 8, the  
hotels may be subdivided into five-star hotels, four-star hotels,  
20 three-star hotels, and two-star hotels. In an embodiment of the  
present invention, the city in which the hotel is located is  
obtained from the user's selection of an airplane destination  
city. In an alternative embodiment, the user is prompted to  
enter the city in which the hotel is located. The user is  
prompted to enter the number of nights that they intend to stay  
25 in the hotel room 81. Alternatively, the number of nights that  
a user will stay in a hotel room is gleaned from the amount of  
time between the departure flight and the return flight. In yet  
another alternative embodiment, the user is prompted to enter  
more than one hotel with arrival and departure dates, and city  
30 locations for each.

In addition to airlines and hotel rooms, a user is also  
prompted to enter car rental information. For example, the car  
rental information may be a choice between different sizes of  
cars 82, such as full, medium, or compact cars. The user is  
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1 prompted to enter the number of days which they wish to rent a  
car 83. Alternatively the number of days for which a user wishes  
to rent a car may be obtained from the amount of time between the  
5 departure flight and the return flight. Alternatively, a user  
is prompted to enter more than one car rental along with the  
locations and duration of each rental.

10 In an embodiment of the present invention, the user  
interface is interactive, so that once a user selects, for  
example, a departure city, a return city, the departure and  
return dates, and seat class for their airline flight, the system  
displays the estimated price range of the airline flight for the  
user 84. Likewise, once the user has entered the destination  
city for the airline flight, the type of hotel they wish to  
15 occupy, the type of room that they want, and the length of stay,  
the system generates an estimated hotel cost 85. Once the user  
has entered an airline destination city and chosen the type of  
car that they wish to rent, as well as the duration of the car  
rental period, the system estimates the car rental price for the  
20 user 86.

25 As the system estimates the prices for the airline tickets,  
the hotel, and the car rental, the system also displays a total  
price estimate for the user 87. In an embodiment, airlines,  
hotel rooms, and car rentals each have a range of prices going  
from a minimum to a maximum, and each of the airline tickets, the  
hotel rooms and the auto rentals may be added up to get a range  
of minimum to maximum overall trip prices. Alternatively, a  
root-mean-square method, or other statistical method to give less  
weight to the extremes of the individual ranges, is used to  
30 calculate the overall range in the total price estimate.

35 In an alternative embodiment, only the lowest priced travel  
products found having the desired characteristics are displayed.  
Likewise, the total price given to the user is calculated by  
adding up the lowest price individual travel products. In yet  
another alternative embodiment, the actual prices and information

1 about each travel product having the desired characteristics are  
displayed, rather than a range of prices.

5 In an embodiment of the present invention, the prompting  
screen contains a button 88 that the user can press to submit a  
request for alternative travel products to take advantage of  
discounts based upon the information already entered. If a user  
selects the alternative suggestion button on the user interface,  
the system generates a list of one or more alternative travel  
10 products for the user. An alternative list is shown in FIG. 10.  
FIG. 10 shows a departure location for an airline 90, an arrival  
location for an airline 92, a departure date and time 94, and a  
return date and time 96. Additionally, the alternative  
suggestion generated for the user displays a hotel classification  
15 98, and room information 100 as well as a car rental description  
102. The alternative suggestion displayed to the user also  
contains a total estimated price 104. Finally, the alternative  
suggestion displayed for the user contains a category entitled  
"Savings" 104, in which the steps taken to lower the cost of the  
20 travel are detailed for the user. For example, the alternative  
suggestion may propose a lower total price if the user is willing  
to depart 1 day earlier to capture a Saturday night stay  
discount. The lower total price may be the result of a cheaper  
airline flight, even though the hotel and car rental prices may  
25 increase.

30 In an alternative embodiment of the present invention, the  
system automatically generates and displays a list of one or more  
alternative travel products for the user. The alternative list  
is forwarded to a user along with a list of travel products that  
satisfy their request parameters. The list of travel products  
may take the same form as the list shown in FIG. 10 and  
previously described.

35 In another alternative embodiment of the present invention,  
the user inputs a departure city, a departure date, a destination  
city, and a length of stay. The various inputs may be general

1 for example, a departure or destination state, as well as a  
desired month of departure. In an additional embodiment, the  
user also inputs how flexible they are with regard to at least  
5 one of the departure city, departure date, destination city and  
length of stay. The user may input limited information and the  
processor may explore many alternatives. For example, a user can  
enter the departure city, destination city, and the price they  
wish to spend. Once the trip information is entered by a user,  
10 the processor runs numerous permutations to determine different  
prices for different options. The processor generates a user  
interface presenting the different options to the user along with  
dates, flight, hotel and car rental information for each option.

15 If, for example, the user enters that they wish to travel  
from Los Angeles to new York for 5 days in February and would  
like to stay within in a budget of \$1,000, then the user enters  
the information and leaves any other input boxes empty. The  
processor then searches the databases, and using an optimization  
scheme, such as linear programming, determines all of the options  
20 that fit the user's parameters. If there are many permutations  
then the permutations may be listed from lowest price to highest  
price. If there are no permutations that fit the request, the  
system proposes the closest permutation for the users education.

25 Once a travel product list is displayed for a user, a user  
is prompted to purchase any or all of the travel products offered  
to them. For example, a user is prompted to purchase airplane  
flights that fit within the requested travel product parameters.  
If the user elects to make a purchase, then the user is prompted  
for their personal information and payment information so that  
30 the processor may contact the selected travel product sellers to  
make the requested reservations and purchases.

35 In should be realized that the above travel products are  
only representative and that the system and method are applicable  
to other types of travel products. In an embodiment, the user  
may request cruise travel products. A user selects a cruise by



1 entering a cruise departure date, a cruise departure location,  
a cruise destination location, a cruise return date, and a cruise  
passenger class. In an additional embodiment, the user may elect  
5 train travel products. A user selects a train trip by entering  
a departure date, a departure location, a destination location,  
a return date, and a passenger class. In another embodiment the  
user may elect travel activity products such as scuba diving,  
snorkeling, and safari tours.

10 The preceding description has been presented with reference  
to presently preferred embodiments of the invention. Workers  
skilled in the art and technology to which this invention  
pertains will appreciate that alterations and changes in the  
described structure may be practiced without meaningfully  
15 departing from the principle, spirit and scope of this invention.  
Accordingly, the foregoing description should not be read as  
pertaining only to the precise system and method described and  
illustrated in the accompanying drawings, but rather should be  
read consistent with and as support for the following claims,  
20 which are to have their fullest and fairest scope.